REMARKS

This is in response to the Office Action dated October 31, 2007. In view of the foregoing amendments and following representations, reconsideration is respectfully requested.

By the above amendment, claim 21 is amended. Thus, claims 21 and 23-40 are currently pending in the present application.

Note that support for the amendments made to claim 21 can be found at least in Figs. 5-8 and page 22, line 20 to page 28, line 10 of the specification as originally filed. In particular, Figs. 5-8 and page 22, line 20 to page 28 line 10 disclose an inverted-F antenna element, a helical antenna element, and a meander antenna element as examples of an unbalanced antenna which includes an antenna element mounted in the projection portion and a grounding conductor (radio communication circuit). Furthermore, it is described on page 23, lines 15-17 of the specification that "another end thereof is electrically connected with a ground conductor formed on the lower substrate 201 of the lower housing 103 so as to be grounded".

On pages 3-4 of the Office Action, claim 21 is rejected under 35 U.S.C. 103(a) as being upatentable over Silzer, Jr. (U.S. Patent Application Publication No. 2004/0001022) in view of Dosch (U.S. Patent No. 6,587,698) and further in view of Nevermann (U.S. Patent No. 6,921,170). It is submitted that the present invention, as defined in amended claim 21, now distinguishes over the Silzer, Dosch and Nevermann references for the following reasons.

The present invention, as defined in claim 21, requires the following components:

(A) A portable radio communication apparatus comprising:
(B) a housing containing a radio communication circuit;
a projection portion having a first end portion connected to said housing, a second end portion connected to said housing, and a central portion located between the first and second

end portions, said projection portion configured to project from said housing at an obtuse angle thereto;

(C) a grounding conductor arranged in said housing: and

an antenna element connected to the radio communication circuit through a feeding point above the grounding conductor,

(D) wherein at least one part of said antenna element is mounted in at least one of an inner part and a surface of said projection portion, wherein an unbalanced antenna is formed by the antenna element and the grounding conductor, and

(E) wherein, when said housing is supported on a flat surface, a surface of said housing opposes the flat surface and is floated from the flat surface by said projection portion so as to form the obtuse angle between said projection portion and the surface of said housing, thereby separating the grounding conductor of said antenna element from the flat surface, and suppressing any deterioration of antenna gain due to electromagnetic coupling of the grounding conductor with the flat surface.

The above features have been identified with letters A-E for ease of reference to the limitations of claim 21. The portable radio communication apparatus according to the present application is configured so that an unbalanced antenna is constituted by the antenna element at least a part of which is mounted in the projection portion and the grounding conductor formed in the housing. That is, in the configuration of the present application, elements equal in length according to a frequency of interest are formed as the antenna element and the grounding conductor, respectively, and radio waves are generated from both elements.

The operation of the unbalanced antenna will be explained with reference to Figs. A and B of the attached Exhibit, which is provided to facilitate the ensuing discussion.

Generally speaking, in a transmission line (e.g., a coaxial cable), currents having opposite directions flow on the signal line and on the ground, respectively. Due to this, radio waves propagate in the line without being radiated into space.

However, with the configuration of a dipole antenna (see Fig. A), directions of the currents are made uniform by bending an open portion of the transmission line, and thus, radio

waves are radiated into space. In this case, a standing wave is generated according to the length of each element and a resonance frequency is determined by the standing wave.

Fig. B shows an antenna configuration according to the present application which employs a dipole antenna. In the present application, the antenna is arranged so that a longitudinal direction of the antenna extends in an arch-shaped projection portion. By adopting such a configuration, the direction of the current flowing on the antenna element mounted in the projection portion is made almost uniform with that of the current flowing on the grounding conductor formed in the housing. The radio waves are thereby radiated into space with the same mechanism as that of the dipole antenna shown in Fig. A.

In this case, in the antenna element according to the present application, the current flows most strongly near the feeding point whereas no current flows at the open end portion of the antenna element mounted in the projection portion. Accordingly, even if the open end portion of the antenna element is directed downward of the housing, cancellation of the current flowing on the antenna element by that flowing on the grounding conductor is almost negligible.

Moreover, if the housing is disposed on a steel desk and the grounding conductor formed in the housing is proximate to the steel desk, then electromagnetic coupling occurs between the grounding conductor and the steel desk, a current having a reversed phase with respect to a phase of the current flowing on the grounding conductor flows on a contact surface of the steel desk, the impedance characteristic greatly changes, and radiation gain from the grounding conductor is reduced.

With the configuration claimed in the present application, the current flows most strongly

near the feeding point. Thus, it is possible to effectively suppress the occurrence of the electromagnetic coupling by separating the grounding conductor from a metal object such as the steel desk. In other words, the present invention provides the notable advantages of separating the grounding conductor from the flat surface by the projection portion, and of suppressing change in the impedance characteristic of the unbalanced antenna by including the component B of claim 21.

As will be demonstrated below, none of the applied prior art references disclose or suggest such a technical concept.

Dosch discloses a configuration in which an antenna element 6 is mounted in a part of a projection portion 8 and in which the antenna element 6 is connected to a radio circuit 4 via a feeding point 6b. However, the Dosch reference merely discloses an arch-shaped quarter wave rod antenna (monopole antenna) and a projection portion (diffuser 8) that is arranged straight relative to a housing (plug-in communication card 1). Thus, the Dosch reference does not disclose or suggest limitation B of claim 21.

Silzer discloses a movable handle in FIG. 6D and a state in which a housing is held in an inclined orientation with respect to an arrangement surface by the handle in FIG. 6E. However, Silzer merely discloses an antenna/bumper combination 20 that serves to protect the circuitry housed within PDA 10 (see paragraph [0027]). Thus, Silzer clearly does not disclose or suggest the antenna structure claimed in claim 21.

Moreover, with the configuration disclosed in FIG. 6E of Silzer, the angle between the housing 55 and the handle 60 is acute, and thus it would be most difficult to apply an unbalanced

antenna according to the present application in the Silzer PDA for the following reasons.

Fig. C(a) of the attached Exhibit shows an arrangement in which the antenna is provided on the handle 60 of the configuration shown in FIG. 6E of Silzer. Although Silzer fails to describe the grounding conductor, it is assumed that the grounding conductor is formed in the housing in view of Dosch.

Since the projection portion is arranged at an acute angle with respect to the housing, the direction of a current flowing on the antenna element mounted in the projection portion is generally opposite to that of a current flowing on the grounding conductor. This makes it difficult to radiate radio waves into space, and results in considerable deterioration in radiation efficiency of the antenna. Therefore, even if the Silzer apparatus could be combined with Dosch, sufficient performance as an unbalanced antenna could not be achieved.

Meanwhile, if the angle between the housing and the projection portion is obtuse, as in the present application, then the direction of the current flowing on the antenna element mounted in the projection portion is almost made uniform with that of the current flowing on the grounding conductor formed in the housing as shown in Fig. C(b) of the attached Exhibit, and thereby radio waves can be radiated into space.

Accordingly, Silzer does not disclose or suggest the radiation characteristic of an unbalanced antenna, and a person of ordinary skill in the art would not have attained component B of claim 21 of the present application based on the combined teachings of the Dosch and Silzer references.

Nervermann discloses a configuration in which a housing 10 is inclined and held by a

stand 23. The configuration disclosed in Nervermann is intended to irradiate beams S emitted from light sources 3, 4 onto a projection surface 2 of a table surface 24 as shown in FIG. 1, and to secure a distance for displaying images as disclosed in FIG. 6.

Thus, Figs. 1 and 3 of Nervermann disclose a configuration in which an <u>acute</u> angle is formed between the stand 23 and the housing 10 so as to facilitate irradiating beams onto the table surface. Further, Nervermann does not disclose or suggest an antenna configuration used for communication.

Therefore, similar to the combination of Silzer and Dosch, sufficient performance as an unbalanced antenna cannot be obtained from any combination of the Dosch and Nervermann references. Accordingly, the Dosch/Nervermann combination does not result in a radio communication apparatus including component B of the present application as set forth in claim 21.

In view of the above, it is submitted that the collective teachings of the applied prior art references would not have resulted in a radio communication apparatus including an unbalanced antenna formed by the antenna element and the grounding conductor, wherein, when said housing is supported on a flat surface, a surface of said housing opposes the flat surface and is floated from the flat surface by said projection portion such that an obtuse angle is formed between said projection portion and the surface of said housing, thereby separating the grounding conductor of said antenna element from the flat surface, and suppressing any deterioration of antenna gain due to electromagnetic coupling of the grounding conductor with the flat surface.

Furthermore, it is submitted that operation as an unbalanced antenna cannot be expected

from any combination of the Dosch, Silzer and Nervermann references. Hence, the present invention, as defined in claim 21, would not have been obvious in view of the applied prior art references.

In view of the above, it is submitted that the present application is now clearly in condition for allowance. The Examiner therefore is requested to pass this case to issue.

In the event that the Examiner has any comments or suggestions of a nature necessary to place this case in condition for allowance, then the Examiner is requested to contact Applicant's undersigned attorney by telephone to promptly resolve any remaining matters.

Respectfully submitted,

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EXHIBIT

FIG A

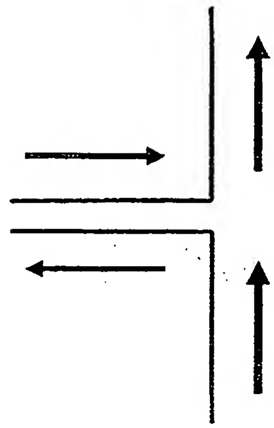

FIG B

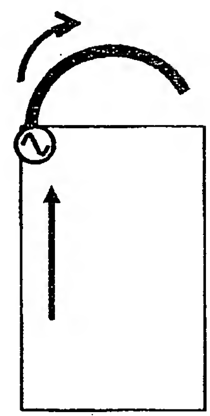

FIG C

(a)

(b)